

THE ANNALS

AND

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“..... per litora spargite muscum,
Naiades, et circum vitreos considite fontes :
Pollice virgineo teneros hic carpite flores :
Floribus et pictum, diva, replete canistrum.
At vos, o Nymphæ Craterides, ite sub undas ;
Ite, recurvato variata corallia trunco
Vellite mi.scosis e rupibus, et mihi conchas
Ferte, Dea pelagi, et pingui conchylia succo.”
N. Parthenii Giannettasii Ecl. 1.

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I.—*Biological Contributions.* By GEORGE J. ALLMAN, M.B., F.R.C.S.I., M.R.I.A., Professor of Botany in Trinity College, Dublin, late Demonstrator of Anatomy and Conservator of the Anatomical Museum, T.C.D.

[With two Plates.]

[Continued from vol. xix. p. 370.]

No. III. *Description of a new Genus and Species of Entomostraca**.

THE interesting little Crustacean which forms the subject of the present notice, though apparently extensively distributed, would seem to have hitherto received but little attention. The first recorded notice of its existence will be found in the ‘Athenæum’ report of the Thirteenth Meeting of the British Association for 1843, from which it will be seen that at that meeting, Mr. Patterson of Belfast mentioned the occurrence of a minute crustacean in the branchial sac of *Ascidia communis*. The fact then noticed by Mr. Patterson was at the time familiar to me, having previously obtained the crustacean in *Ascidia* dredged in the harbour of Glandore, county Cork, though I had not till a later period paid any attention to its structure.

In letters since received from Mr. Thompson of Belfast, to whom the little animal was well known, and from Mr. Patterson, I have obtained full information relative to the existence of the

* Read before the Royal Irish Academy, April 12, 1847.

crustacean on the coast of the north of Ireland. The latter gentleman informs me that he procured it in great abundance in July 1840, while dredging off the coast of Bangor, county Down; he thinks that nine or ten *Ascidia* out of every twelve dredged up were inhabited by the parasite, the number in each varying from two to six or seven.

In March 1846 I again obtained specimens of the little crustacean in the branchial chamber of individuals of *Ascidia communis* cast upon the shore of Dublin Bay. A careful examination now convinced me that it had not yet obtained a name or place in our systems, and that it was generically distinct from all hitherto described forms, a fact which the more surprised me when I reflected on its apparently extensive distribution, and the circumstance that M. Edwards, our great authority on the Crustacea, had made certain forms of the *Ascidia* the subject of scarcely less elaborate and beautiful research. The following characters were accordingly at once drawn out, though their publication has been deferred up to the present time.

NOTODELPHYS*.

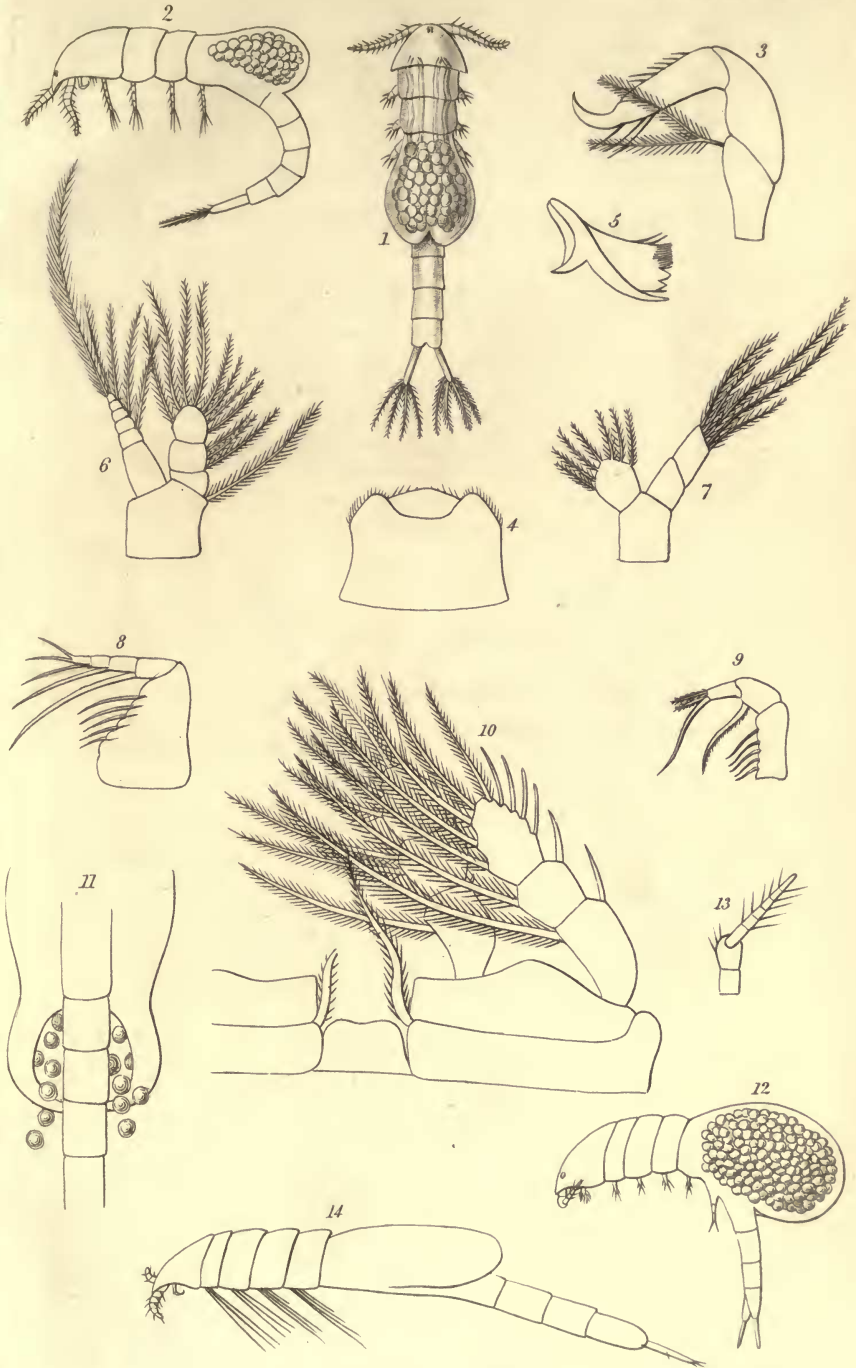
GEN. CHAR. *Body* elongated. *Head* scutiform and bearing in front a solitary median eye. *Antennæ* two, filiform, multiarticulate. *Mouth* with a pair of mandibles, and surrounded by five additional pairs of appendages, of which the anterior as well as the last two pairs are prehensile. *Thorax* having but two rings distinct, the anterior one being confounded with the head. Female with a large dorsal ovigerous receptacle immediately behind the last distinct thoracic ring. *Locomotive feet* four pairs, biramous natatory. *Abdomen* of about five rings, the last of which is terminated by two setigerous appendages.

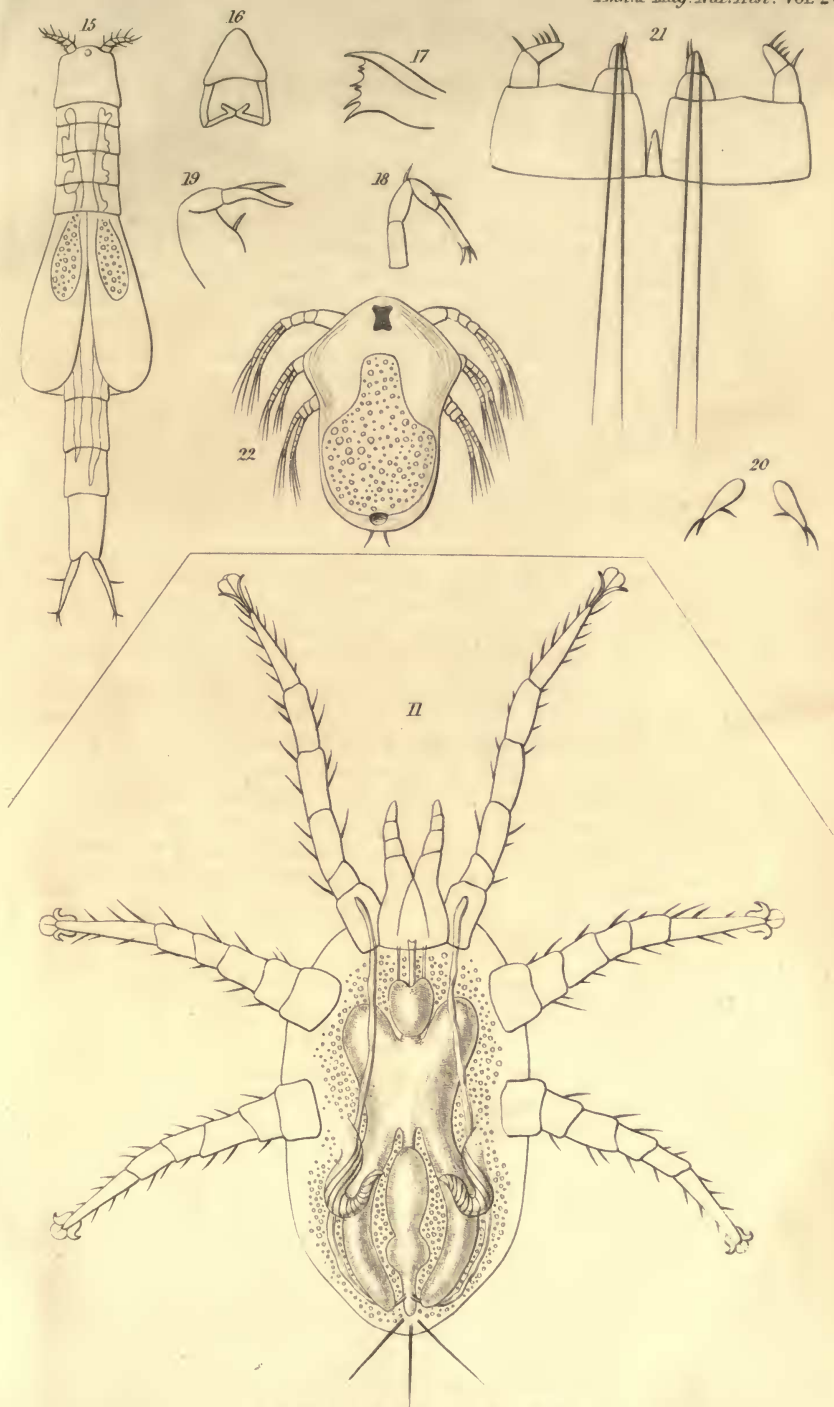
Species unica, *N. ascidicola*. Pl. I., II.

Hab. Swimming freely in the branchial sac of *Ascidia communis*. Belfast Bay, *Wm. Thompson* and *G. C. Hyndman, Esqrs.*; Bangor, co. Down, *R. Patterson, Esq.*; "found in *Ascidia* dredged from a muddy bottom at a depth of from fifteen to twenty fathoms in Strangford Lough, co. Down," *Wm. Thompson* and *G. C. Hyndman, Esqrs.*; in *Ascidia* dredged in Killery Bay, co. Galway, in 1840, *R. Ball* and *W. Thompson, Esqrs.*; Glandore Harbour, co. Cork, Dublin Bay, and Southampton water, *G. J. A.*

Notodelphys ascidicola, of which I have as yet found only females, measures somewhat less than a line in length and bears a considerable general resemblance to *Cyclops*. The cephalic segment is slightly prolonged anteriorly into a kind of beak, immediately below which is a pair of multiarticulate setigerous

* From $\nu\acute{o}\tau\omicron\varsigma$, *tergum*, and $\delta\epsilon\lambda\phi\upsilon\varsigma$, *matrix*.





Larva of *Halarachne Halichari*

antennæ followed by a pair of appendages (fig. 3) composed of four joints, the terminal joint presenting itself under the form of a hooked prehensile claw, and the basal bearing at its distal extremity a double plumose seta.

Situated at a short interval behind the last-mentioned pair of appendages and occupying a position near the centre of the under surface of the cephalic segment is the mouth, covered by a largely developed upper lip (fig. 4), and guarded on each side by a strong toothed mandible (fig. 5). External to the mandibles are the first and second pairs of maxillæ. Those of the first pair (fig. 6) consist each of a flattened peduncle bearing two jointed rami which are furnished with numerous plumose setæ; upon the external ramus, one of these setæ is very large, assuming the appearance of a flagelliform appendage, and a similar, though smaller one, springs from the internal edge of the peduncle. The second pair of maxillæ (fig. 7) does not differ essentially from the first, but is smaller and not furnished with such greatly developed flagelliform setæ.

The maxillæ are succeeded by two pairs of prehensile appendages (figs. 8 and 9): each consists of a large basal joint with a terminal articulate stem; stiff setæ are carried upon the internal side of both peduncle and stem, and on the stem one or more of these becomes developed into a prehensile spine.

Behind the last-described appendages, the cephalic segment bears a pair of natatory feet resembling those which are borne upon the succeeding segments of the body.

There are altogether four pairs of natatory feet. The first of these, as just mentioned, is borne on the cephalic segment; the second and third are supported respectively on the two distinct rings which immediately follow; while the fourth is placed below the anterior end of the ovigerous region. Each of these natatory feet (fig. 10) consists of a basal lamina composed of two joints, and bearing on its distal edge two rami formed each of three flattened articulations which are copiously furnished upon their inner edge with plumose setæ; the setæ borne by the external edge are shorter and not plumose. The proximate joint of the basal lamina carries upon its inner edge a plumose spine, and it is connected with its fellow of the opposite side by an intermediate plate which renders it necessary that the motions of the basal joints of each pair of feet should be strictly in concert.

The abdomen is somewhat cylindrical, and composed of about five rings, the most posterior of which is prolonged, as in *Cyclops*, by two diverging cylindrical appendages, each of which carries upon its distal extremity four plumose setæ.

The external receptacle for the ova consists of a large dorsal sessile sac, situated between the last distinct thoracic ring and

the abdomen ; it is slightly lobed posteriorly, and filled with ova of a deep olive-green colour, and in the angle between it and the upper surface of the abdomen is an aperture through which the ova escape at maturity (fig. 11). As will hereafter be seen, it must be viewed as formed by the confluence along the mesial line of two pieces originally distinct. The large size of this organ and the deep colour of the contained ova render it one of the most striking features in the physiognomy of the little animal, and the contrast which it presents with the surrounding lighter tissues of the Ascidian makes the detection of the parasite a matter of no difficulty.

In company with *N. ascidicola* and differing in several important particulars from the latter as just described, I have not unfrequently met with two little Crustaceans which deserve here some attention. My belief is that they are not specifically distinct from the subject of the present notice, but must rather be viewed as immature states of this animal. In one of them (fig. 12) the antennæ (fig. 13) are geniculated, and consist of a thick peduncle, from which the terminal portion, which is subulate, multiarticulate and setigerous, passes off abruptly at an angle. The cephalic segment carries no proper feet, and the thorax presents three distinct rings with a pair of natatory feet attached to each ; the fourth pair is borne as in the adult, beneath the anterior extremity of the ovigerous sac, and at a short distance behind these last is a pair of small stiliform organs terminated by setæ. The last ring of the abdomen is bilobed, and is prolonged by a pair of cylindrical appendages. The ovigerous sac is disproportionately large, and the habits of the animal are peculiarly sluggish.

The other (figs. 14 and 15) differs still more from the adult than does that just described. The antennæ are short and thick, and not geniculated. The cephalic segment, as in the last, supports no locomotive feet, while four distinct rings may be demonstrated in the thorax, each bearing a pair of biramous natatory feet, and the abdomen would appear to be composed of five segments, the last terminated as usual by a pair of cylindrical appendages. The external receptacle for the ova presents itself in this little animal as two hollow organs perfectly distinct from one another except at their origin. They appear to arise immediately behind the fourth thoracic ring, and are thence continued backwards, embracing the sides of the abdomen.

The mouth is provided with a very large labrum (fig. 16), which is prolonged anteriorly by means of a conical projection between the bases of the antennæ. The labrum conceals two strong denticulated mandibles (fig. 17), and the oral apparatus is completed by two pairs of maxillæ and three additional pairs of appendages (figs. 18—20) as in the adult ; of these last, that which im-

mediately succeeds the maxillæ (fig. 19) is well-developed and didactyle, the next (fig. 20) is rudimentary.

The proper feet (fig. 21) carry two slightly developed rami, the external of which bears some short stiff spines, and the internal is furnished with two or three remarkably long setæ not plumose, with a few short ones at their base.

The internal ovaries may be traced throughout the whole of the thoracic and a considerable portion of the abdominal region, and may already be seen forming a kind of hernia into each of the external receptacles (fig. 15).

While engaged in the examination of the first of the forms just described as immature conditions of *Notodelphys ascidicola*, I happened to witness the escape from the ovigerous receptacle of ova which were expelled through the opening already mentioned as existing in the postero-inferior part of this organ. Through the delicate transparent covering of the expelled ova, the form and motions of the embryo could be seen within, and indeed it required in many cases but a few minutes to elapse between the expulsion of the egg and the rupture of its shell by the struggles of the imprisoned embryo. The little larva (fig. 22) thus set free presented itself under the form of an exceedingly active, natatory, arachnoid animalcule with six biramous feet furnished with a pencil of setæ at the extremity of each ramus; the eye-mass, which was of a bright ruby colour, was well-developed, and had the appearance of being formed by the confluence of four distinct ocelli, and the little creature presented altogether a close resemblance to the young of *Cyclops*.

If I am correct in my opinion as to the nature of the different forms now described, we have, during the progress of development of *N. ascidicola* from the first rupture of the egg, four distinct phases; that a greater number exist there can be little doubt, but at least four well-defined forms can with certainty be demonstrated.

The first (fig. 22) is characterized by an absence of distinct segmental division; only three pairs of feet have as yet appeared; these exhibit no appearance of the lamellar character, so striking in the more advanced phases; and the intermediate plate not being yet developed, there would seem to be no mechanical obstacle to the feet of opposite sides acting independently of each other. The eyes are well-developed and already confluent, there is no trace of antennæ, and we have altogether a form which strongly suggests the *acaridan* type of the *Arachnida*.

Between this first stage of the larva and the next in point of development which I have had an opportunity of witnessing, a most striking progress has taken place. It is however almost certain that there are intermediate stages which I have not yet

succeeded in detecting. Be this as it may, the creature has now (figs. 14—21) assumed the essential form of the adult, the division of the body into segments is complete, the antennæ have appeared, the mouth with its lip, mandibles, maxillæ and accessory appendages, have acquired nearly their mature condition, and four pairs of true feet are present, the head is quite distinct from the thorax, which presents four distinct rings, and the abdomen exhibits five rings and the terminal appendages. The internal ovaries are developed, and the external receptacles are present, but as yet distinct, showing no tendency to coalescence except at their origin. The true feet have assumed a lamellar condition, the rami however are but slightly developed, and the pencil of long bristles with which the internal ramus is furnished suggest to us the feet of certain *annelides*. As the intercoxal plates have begun to develop themselves, the legs of opposite sides must now act simultaneously. The habits of the animal are remarkably sluggish, and all its motions, as well indeed as its general physiognomy, remind us strongly of an *annelidan*.

In the next stage (figs. 12, 13), the progress of *consolidation* has become manifest, thus presenting us in this respect with a retrocession towards the early condition of the larva. The head continues distinct from the thorax, but the fourth thoracic ring is confounded with the posterior region of the body. The ovigerous receptacles have now become united along the mesial line, and are loaded with ova. The motions are still sluggish.

In the final stage (figs. 1—11) the progress of consolidation has still further advanced, the head has become inseparably united with the first thoracic ring, so that but two segments are now distinct in the thorax. The creature is natatory, and eminently active.

The high development of the reproductive system in the second and third of the phases just described may appear opposed to the opinion here expressed, that these are animals in an immature condition. The objection however will lose all its validity when we recollect that innumerable recent observations go to prove that the exercise of the generative function is by no means necessarily confined to the adult state. Whether however we do or do not admit the specific identity of all the forms now described, it is certain that they present us with a series of phases in progressive development; and the light thus thrown upon the morphology of *Notodelphys ascidicola* is almost entirely the same, whether we view them as different ages of a single species, or as permanent or transitory conditions of several species.

General Considerations.

As to the exact zoological position of our little crustacean, it